Impact Factor:					
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	JIF = 1.500	SJIF (Morocco) = 7.184	OAJI (USA) = 0.350

SOI: 1.1/TAS DOI: 10.15863/TAS

International Scientific Journal

Theoretical & Applied Science

p-ISSN: 2308-4944 (print) **e-ISSN:** 2409-0085 (online)

Year: 2024 **Issue:** 10 **Volume:** 138

Published: 29.10.2024 **http://T-Science.org**

Issue Article

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STUDENT DEVELOPMENT IN THE PROCESS OF TEACHING PHYSICS

Abstract: *This article analyzes the problems of the development of educational and cognitive enthusiasm of students in physics lessons during the scientific and technical revolution. The methodological possibilities of widespread use of the system of teaching aids in physics lessons, pedagogical prerequisites for achieving high results with the least expenditure of time and effort are revealed. Methodological foundations for the development of such competencies as the use of measuring instruments in teaching physics, analysis of measurement results using tables and graphs, determination of ratios between physical quantities, explanation of natural phenomena and principles of operation of technical devices based on acquired knowledge, and their application to solve practical problems are being improved.*

Key words: *physics course, unified physical image of the world, scientific worldview, virtual laboratory work, competencies, physical phenomena, photoelectric effect, process modeling.*

Language: *English*

Citation: Axmedov, Yo.O. (2024). Student development in the process of teaching physics. *ISJ Theoretical & Applied Science, 10 (138),* 189-196.

Soi: http://s-o-i.org/1.1/TAS-10-138-22 ***Doi***: https://dx.doi.org/10.15863/TAS.2024.10.138.22

Scopus ASCC: *3304.*

Introduction

During the scientific and technological revolution, when there is a rapid growth of scientific knowledge and its widespread introduction into production, the school faces the task of equipping its graduates with a system of solid knowledge and the ability to independently replenish them and develop their cognitive abilities. The most important factor in the successful formation of solid knowledge in physics is the development of educational and cognitive enthusiasm of students in the classroom, which is achieved by intellectual and emotional preparation of schoolchildren for the perception of new educational material. The latter implies the widespread use of a system of teaching tools in a fully equipped physics classroom, which allows the teacher to use any learning tools in a complex, in a system with the least amount of time and effort. Thus, the relevance of our research is due to the problems listed above. Teaching physics in primary school is aimed at familiarization with physical phenomena and methods of scientific knowledge of nature, at forming ideas about the physical picture of the world on this basis. In physics lessons, students should learn how to observe natural phenomena, use measuring instruments to study physical phenomena, present measurement results using tables and graphs, identify dependencies between physical quantities, apply the knowledge gained to explain natural phenomena and the principles of operation of technical devices, to solve practical problems of everyday life and ensure life safety.

Main part.

The process of teaching physics should be focused on the development of cognitive interests, intellectual and creative abilities of students, on the formation of skills to independently acquire new knowledge in accordance with life needs and interests. The study of physics should contribute to the education of students by forming a conviction in the cognizability of the surrounding world, in the need for the reasonable use of science and technology for the further development of human society, as well as in

fostering respect for the creators of science and technology as important participants in the process of creating a universal culture. In the practice of school work, the task of mastering the sum of knowledge usually comes to the fore. However, without the development of mental abilities, any amount of knowledge recognized as necessary for everyone today will be considered incomplete tomorrow. Therefore, an urgent task of the modern Russian school is to shift the focus from the process of knowledge transfer to the process of developing students' intellectual and creative abilities. The purpose of the work is to describe in detail the development of students in the process of teaching physics. The object of the study is the process of developing cognitive activity of students in the study of physics in secondary school. The objectives of the course work are: - to study the development of intellectual, practical and information skills of students in physics lessons, to talk about the development of creative abilities of students in physics lessons, to analyze the development of thinking and speech of students in the process of teaching physics. Structure. The course work consists of an introduction, 5 chapters, a conclusion and a list of references. 1. The development of intellectual and practical skills of students in physics lessons, new living conditions put forward special requirements for young people entering life: they must be not only knowledgeable and skillful, but also thinking, proactive, independent. Therefore, pedagogical science is faced with the task of developing students' thinking and the ability to creatively apply knowledge in practice. As mentioned earlier, the purpose of training is the development of the student, in particular his intellect. The basis of this process is its independent cognitive activity. In physics lessons, you can develop your students' thinking, educational, communicative and practical skills, moral ideals, and aesthetic ideas. Psychologists distinguish the following mental operations: analysis, synthesis, comparison, generalization, classification, systematization, induction, deduction, abstraction, concretization. Practical skills include: working with a book, a reference book; writing an abstract, conducting observations, drawing up tasks, setting up an experiment, solving inventive tasks, writing a review, and others. There are several approaches based on independent cognitive activity. A research approach to learning. Its characteristic feature is the realization of the idea of "learning through discovery". Within the framework of this approach, the student himself discovers a phenomenon, a law, a pattern, properties, a way to solve a problem that he had not previously known. At the same time, it is based on the cycle of cognition: from observation and experiments to the construction of an abstract model (hypothesizing), then the conclusion of theoretical consequences and their experimental verification. An example of this type of lesson can be a lesson in which students in groups behave like experimenters and try to gain new information about the properties of magnets by answering the questions of the cards. Card No. 1. The phenomenon of magnetization. Card No. 2. The poles of the magnet. Card No. 3. The appearance of magnetic properties. Card number 4. The interaction of the poles of the magnet. Card number 5. The study of the magnetic field of a permanent magnet is a communicative or debatable approach. He assumes that the student becomes the author of some point of view on a certain scientific problem for some time. When implementing this approach, the ability to express one's opinion and understand someone else's, conduct criticism, look for positions that combine both points of view and find a compromise is formed. Let's consider the implementation of this approach during the lesson "The future of the electric power industry: traditional or non-traditional energy sources?" Several groups of students are organized, who prepare for the lesson in advance, each according to its own topic. The following issues were discussed: 1. production of electricity at power plants using traditional energy sources; 2. non-traditional sources of electricity; problems of electricity transmission; energy systems and their necessity; environmental consequences of the operation of power plants (ES). The class is divided into teams or groups, each of which independently works on a common task, imitating one or another institution or company. The results of the activity are then discussed, evaluated, and the best and most interesting ones are determined. An example of such an approach can be a lesson on project protection, improvement of barometers, granting a patent for a diffraction grating, a lesson on "What happens if ...?" (for example, gravity disappears). Problem-based learning is a method based on the use of learning problems in teaching and involving students to actively participate in solving these problems. Solving a problem begins with its formulation - the first stage. At the next stage, the student tries to find a way out of the difficulty. During the search for a new solution, ideas and guesses appear, which are either rejected or accepted as a working hypothesis. The third stage involves developing ways to test the hypothesis and implement it. When studying the molecular structure of matter, the question arises: why do bodies not break up into separate molecules, between which there are gaps? After observing the connections of lead cylinders and two pieces of plasticize, the guys conclude about the attraction of molecules. A new question: why don't pieces of paraffin and pieces of paper stick together? Students quickly understand: to connect the pieces of paraffin, they need to be heated, and the pieces of paper need to be moistened. The hypothesis is tested experimentally and a conclusion is drawn about the attraction of molecules at a distance comparable to

their size. A new problem: why are there gaps between molecules? The guys assume that there is a repulsion between the molecules and verify the conclusion experimentally. Often, the formulation of a problem and an attempt to solve it is facilitated if it is possible to involve students themselves in conducting experimental studies to detect patterns. For example, when studying the Archimedean force, we find out together with the class what it depends on. Various hypotheses are put forward: the force depends on the mass, volume, density of the body, depth of immersion, type of liquid. The class is divided into groups, each of which experimentally tests one of the hypotheses. When summarizing the results of individual groups, the results are discussed alternately, and then a general conclusion is drawn: the buoyant force depends on the volume of the body and the density of the liquid. We form a mental operation analysis when performing tasks such as: - select a boiling process parameter that remains constant during boiling; - highlight examples in the textbook paragraph confirming the dependence of the diffusion rate on body temperature; - analyze the condition of the task and identify the interacting bodies, describe what happens to each; - specify the cause and effect in the observed process; - make a research plan, highlighting the most important stages of the work. Solving experimental problems requires the ability to plan an experiment, which implies the correct choice of equipment, hypotheses, etc. At the first stage of teaching physics, we give students a general algorithm of execution, i.e. we introduce them to the general principles of experimental knowledge of the world. They reflect a chain of questions or "steps" that tell you what needs to be done. To do this, we use the "Learning to set up an experiment" sheet. Students' independent experiment is successfully used not only as a way to learn new things, but also as a way to consolidate and repeat the material they have passed. Creative tasks have been developed for a number of laboratory works. Home observations and experiments are of great importance: come up with a way to measure the height of a tree; examine the charge sign of electrified bodies, etc. Already in the first lessons, I draw the attention of seventh graders to the importance of the ability to find cause-and-effect relationships: many people observe the same phenomena, but only understanding the causal relationship led G. Galileo to discover the law of inertia, I. Newton to formulate the law of universal gravitation. To develop this skill, for example, you can make one sentence by combining two statements in it with the help of the union "therefore": the mass of an iron ball is greater than the mass of a wooden ball of the same volume; the density of iron is greater than the density of wood. Which of the two statements is the cause in relation to the other, and which is the effect? In my lessons, I create conditions under which students would learn to distinguish between cause and effect and mathematical dependence. When studying the resistance of a conductor, we find out experimentally that the formula representing the dependence of resistance on voltage and current strength does not reflect cause-and-effect relationships, since the resistance of the conductor does not change when the voltage at the ends of the conductor and the current in it change. At the same time, the mathematical dependence of the current strength on voltage and resistance, representing the mathematical formulation of Ohm's law for a homogeneous section of a DC circuit, reflects causal relationships: voltage characterizes an electric field, the effect of which on electric charges in a conductor ensures an orderly movement of charges. To develop the ability to compare, tasks are used to compare sliding friction and rolling friction, the molecular structure of bodies in different states of aggregation, comparative tables and others are filled in. Whole lessons are designed for comparison on the topics of "Uniform and equally alternating motion", "Free and forced oscillations", "Electric and magnetic field". Tasks contribute to the development of the ability to synthesize:

- from experiments, we can conclude about the behavior of the body when compensating for external influences; - after completing a number of tasks, create an algorithm for solving problems in dynamics; - prepare a story based on a table, a reference summary, a drawing; - create a drawing task; - write an abstract or report summarizing information from several sources. In simple classification tasks, it is required to formulate a group from the list of physical concepts according to the given characteristics: - from the graphs, select those that characterize the equidistant motion; - from the above words, write down those that represent a physical phenomenon. Natural light sources Artificial light sources in a more complex variety of classification tasks, students are invited to divide the list of physical concepts into groups, based on a comparison of these concepts, to identify their common features. For example, which word is superfluous among the following: meter, degree, force, second, Pascal? why did you choose this particular word? The ability to abstract, i.e. to identify essential features that are important in these conditions, is developed both when performing individual tasks and during a number of lessons in which the model is studied or used. Building a model of a phenomenon or process means simplifying the real situation in such a way that their main essential features are preserved. The systematization mental operation develops when drawing up a structural and logical scheme of the studied topic, outlining on it the basic concepts, laws, formulas and connections between them. We use tasks to compile a table summarizing the content of the topic or commenting on the finished one, on schemes for solving the problem "from the end", i.e. from the question being

asked. Operation concretization means an expression, a process in a visual form, or a clarification. To develop this skill, we use tasks to create drawings, diagrams, and drawings reflecting this phenomenon. Many practical techniques are closely related to mental operations. Take, for example, the process of writing a review. The student needs to analyze what he has listened to or read in order to establish the presence of the necessary components in the material: evidence, examples, conclusions, etc.; perform a comparison with a mental standard to assess the degree of development of the problem or the quality of the answer; make a synthesis to summarize all his assessments and give a conclusion-review. 2. The development of students' information skills in physics lessons, the improvement of methods and the development of active forms of teaching physics is one of the most important means of intensifying and optimizing the educational process. A teacher in a modern lesson should act as an organizer of student activities. Therefore, the task of teaching students to learn comes to the fore. The educational process is organized in such a way that students, using various sources, could independently acquire knowledge. The assimilation of knowledge becomes not an end in itself, but a means to implement the educational and educational functions of learning. This problem can be solved by a combination of the use of developmental learning methods and the formation of information skills. Using the model of the theory of scientific cognition proposed by V.G. Razumovsky, the educational material is divided into separate structural blocks, which allows step-by-step formation of information skills with the creation of a reference summary, i.e. an information model of each block. New material is studied in the lesson in several stages. 1. The teacher's introductory speech. 2. Performing experimental research work. Indirect influence on the physical model in order to determine the relationship between the main characteristics of the physical model, the mathematical description of the model, the establishment of physical laws. Conducting an experiment to verify the main findings. The final part of the lesson is summarizing the results of the work. Using the problem-based search method makes this process creative. To achieve the goals set in the lesson, students have to solve a range of tasks. In the course of work, students themselves search for the necessary information, thus learning. This structure of the study of the topic ensures the manufacturability of the learning process, which students get used to, saves time on organizing the learning process. The goal is not only to get information in a coherent system, but also to teach students to think, find new information, form their own opinions on this basis, and quickly find solutions to problems. Organizational - selection, maintenance, creation of conditions for the manifestation of creative abilities. Friendly climate). Informational - a high level of proficiency in the search for new information, analysis and synthesis in any form, knowledge of the basics of the methodology for the formation of information literacy). Communicative is an organization in the process of exchanging information between students and a teacher. Organization of joint creative activities. The ability to purposefully organize and manage information generalizations. Technological - possession of the necessary amount of information technology. Knowledge of audio, video, projection equipment, PC skills. The use of modern pedagogical technologies. Reflection- analysis, adequate reaction, finding solutions, conducting diagnostics, constant correction. Information technology in the practice of a physics teacher. The task system that the teacher implements during the lesson is the basis for the formation of an information environment. It's interesting about physics... (Poems by children on the theme "Friction has disappeared") From a familiar monkey once. I heard an amazing story. Whether she was joking, or seriously, It turned out to be an amazing curiosity. As if there weren't enough failures in life, Suddenly she fell on a boa constrictor - well, at least cry! And she squeezed her eyes shut: "Well, she thinks, the end!" Death awaits in the arms of the rings. But the boa constrictor was lying like a shoelace, And he wanted to eat it, but he couldn't. I tried in vain to crawl away to the side, Where to weave deadly rings here. He was angry, fuming, exhausted: Neither to the left nor to the right-that's the day! Then vines fell from a height, Onto a boa constrictor, a monkey and bushes. Where a spider was diligently weaving a web, filling his leisure time with hunting. All efforts are in vain-poor weaver! The hapless executioner burst into tears. Complete chaos and confusion in the clearing, But let's get back to our cute monkey. Squinting sadly at the top with my left eye, I tried and tried many times. For some reason, the tail did not cling to the branch, And the paws became smooth as wax, Everything slid, there was no strength to move from the place; And she screamed: "Who deprived us of friction?" Lepekhina Vera, grade 7a Well, what's the trouble with that, That friction will disappear forever? I will feel like a strong man, I don't need any load. I'll slide one finger into the corner of our closet, and I'll score the puck very quickly. And I will slide endlessly on the ice, And now I will live very carelessly. My bike will go wherever I want, even though I don't pedal. Dad has a lot of problems, The engine does not knock and does not heat at all, So just stop scaring me. A weirdo! You understand that this problem has two options, there are only two schemes. Here, friction force is important and necessary, And of course, it is useful to people. But how will you go, how will cars go When there is no shoe at the sole and tire? How do you stop a car, people, Animals sliding faster and faster? You remember that ice is fine too. But still, it is harmful, it is dangerous to be on the ice. You will not fold the house, you will not hammer a nail into the wall, If you

do not return the friction force again. There are two sides to every case, We really need knowledge of physics. And the power that is called the power of God will turn into joy for Us in life. Razuveaeva T., 7th grade, I got up - awesome, the Sutra disappeared friction. And rolling friction, And sliding friction, And even, like, resting friction, God knows what it is now! I was trying to put on my slippers, As if I found myself on a skating rink! Writing pirouettes, Dad flies behind the newspaper, Whatever we take, everything will slip out of our hands. What kind of day is this? Don't you know, friend? I jump around the apartment And try not to touch the wall, Otherwise something bad will happen - And the house will start sliding then. I look out the half-frozen window, and I'm destined to see a real horror there: Engines growl, but cars are standing, And men jump around them, cursing. My brother is yelling at the computer, an oddball, And the mouse is flying this way and that on the mat, And nonsense is flashing on the screen... Mom is flying in the kitchen with a broom, She does not sweep the floor with it, She calls us for help. That's how the whole day passed, A shadow fell on the city. And then there is relief - Our friction has returned! Nastya Alexandrova, 76 grade 3. Development of creative abilities of students in physics lessons Creativity is a factor of giftedness, which is reflected in intelligence tests, academic papers, scientific and technical achievements. Indicators of creativity: fluency, flexibility, originality, high motivation for creativity, independence, openness to new experiences, high need for creativity. I will list the trends in this training system. From the pupil, the student to his personality. From socially oriented education to personality-oriented education. From the pedagogy of requirements to the pedagogy of cooperation and partnership. From the pedagogy of necessity to the pedagogy of freedom, from the pedagogy of guardianship to the pedagogy of support. From pedagogical extremism to tolerance. From uniformity to variability. In the modern paradigm of creative education in the “Student - teacher -student” system they become equal partners. The implementation of the program has the following objectives: 1. Identification and cultivation of the intellectual resource of the country - gifted children. 2. Achieving the maximum level of creativity development. Upon detailed acquaintance with the works of scientists in this field, it turned out that the development of the problem in modern pedagogy is based on the works of Professor Matyushkin. Psychologists highlight the key points: - it is worth taking into account the innate nature of certain personality qualities, but one should not underestimate the possibility of their development, or, conversely, suppression. time should not be lost to support talent, create conditions for creative development, otherwise it may not open up or manifest itself to a small extent, because turning to mental activity only at the age of 16-18 gives a minimum effect. But age restrictions for the development of creative abilities are not essential, according to the saying: “Better late than never.” The student's inner need for self-expression should be taken into account. It is she who creates the conditions for the manifestation of his abilities, the motivation for self-development, the desire of the student to test his abilities. One of the conditions for the development of creative creation of an atmosphere of initiative, competition, discussion. Creativity in the field of physics can be measured by auxiliary methods of solving problems, performing tests, preparing and speaking at seminars and conferences, publishing oral journals, newspapers, and participating in decades of physics. Moreover, according to the students themselves, group work is most preferable. The introduction of technologies, where a collective form of work is manifested, contributes to the formation of communicative skills, the main of which is to be able to hear and listen to others. Students defend their point of view. As a practical confirmation, I offer some forms and examples of creative activity in the context of personal humanitarian education. Spheres of creativity (STV) personality qualities general abilities special abilities critical thinking independence intuition field of manifestation man – technique, man - artistic image, man – man, man – nature, man - sign system activity quality originality productivity efficiency significance novelty methodological knowledge research methods logic, dialectics, synergetics, design modeling programming. Individual receptions: educational conferences, teleconferences, the “Step into the Future” competition, seminars, decades of physics. The issue of “Physical Messengers”, natural science abstracts, full-time and correspondence Olympiads. Conferences on the following topics were held with the greatest success: “Electric power industry Problems, the future of energy”, “Development of communications as an indicator of the development of civilization”, “Nuclear energy”, “Color as a means of information and a factor of psychological comfort”, “Uzbekistan is the birthplace of aviation”, “Ufo Conference". A teacher is like a director who captivates, creating a harmonious unity of thoughts, feelings, goals, tasks subordinated to the realization of joint creative activity. I believe that creative activity develops the process of cognition, thinking and is possible when conducting classes that reveal the global significance of the issues of the scientific and technical process. This process has brought humanity to the modern level of civilization development. The development of students' thinking in the process of teaching physics in the formation of new knowledge and methods of action, it is possible to use various research methods: experimental, theoretical, axiomatic, description. Any research begins with setting a problem, putting forward a hypothesis. The development proposes a technology for hypothesizing

on the example of a specific lesson. The ability to put forward a hypothesis contributes to the development of the ability to analyze, compare, synthesize, forms mental operations: abstraction, generalization, concretization. This is possible both on the inductive and deductive level of the movement of thought from ignorance to knowledge. In the process of problem cognition, concepts, judgments are formed, conclusions are drawn and analogies are drawn. The form of organization of students' work in this case may be different, it depends on the topic being studied, the level of development of the children, their degree of readiness for independent activity. If it is difficult for students to carry out the process of "building" a hypothesis themselves, then the teacher does it, guiding them through all the stages of cognition himself, students in this case are attracted only to the resolution of individual private issues. In a more prepared class or as appropriate skills are formed, the teacher can already use a system of purposeful tasks and questions to lead the students themselves to form a hypothesis, substantiate it and prove it. The advantage of the problem method is that it teaches all students to think; many actively participate in the nomination, in testing hypotheses expressed by classmates. Those who have proposed the wrong ideas have the opportunity to make sure of their mistakes, and to discuss everything, arguing their point of view. Thus, the problem method contributes not only to the development of thinking, but also to the flexibility of the student's thinking as a necessary component for creative activity, since it helps to develop a critical approach and the ability to conduct a dialogue. For a teacher's system of work to activate the cognitive activity of students in learning, it is very important to keep in mind that three levels can be distinguished in mental activity: the level of understanding, the level of logical thinking and the level of creative thinking. Understanding. Understanding is an analytical and synthetic activity aimed at assimilating ready-made information provided by a book or a teacher. In the course of presenting new material, the teacher not only reports new facts, he analyzes the results of experiments, builds theoretical evidence, and deduces new consequences. Its presentation may include abstraction, generalization, comparison, classification, definition, etc. All mental operations (analysis, synthesis, abstraction, generalization), techniques of mental activity (comparison, classification, definition), techniques of logical evidence in the course of explaining the material, the teacher performs himself. Students face a simpler task: to follow the progress and results of the teacher's analysis, synthesis, generalization, comparison, etc., to follow the logic, consistency, evidence of the conclusion. All this requires students to make certain mental efforts, certain analytical and synthetic activities. Mental activity is also needed when studying a text. It is necessary to highlight the main idea of the paragraph, to follow the persuasiveness of its justification, to understand the logic of reasoning, the sequence and stages of derivation of the formula, to correlate specific examples and facts with the proven position, etc. Since the teacher's explanations are usually designed for the level of a particular class, and it is not possible to do this in a textbook, then, as a rule, mastering the text of the textbook requires more effort from students than mastering the teacher's explanation. A deep understanding by students of the reported material is a condition for their assimilation of knowledge and at the same time a school for the development of their thinking, their cognitive abilities. It is in the process of understanding that the student learns the experience of logical reasoning, analysis, synthesis, abstraction and generalization, the experience of performing various mental actions (comparisons, oppositions, comparisons, classifications, definitions, etc.). Repeating the reasoning of the teacher and the textbook, imitating them, the student learns the techniques of mental activity. Therefore, a deep understanding of the material by students is a prerequisite for their independent solution of cognitive tasks, is the first stage of their cognitive activity. The system of work on the activation of cognitive activity, first of all, should include a system of techniques that guide the mental activity of students in the process of their perception of the material presented by the teacher or in the book. It is also necessary to have a clear idea of which methods of explaining the material provide the most in-depth assimilation and contribute to the comprehensive development of students' thinking. Obviously, the choice of methods of explanation is determined by the level of development of students and the nature of the material being presented, since various methodological requirements can be imposed on the presentation of physical theories, laws, concepts. Logical thinking. Logical thinking is understood as the process of independently solving cognitive tasks. At this level of cognitive activity, students should be able to independently analyze the studied objects, compare their properties, compare the results of individual experiments, draw generalized conclusions, perform classification, proofs, explanations, derive formulas, analyze them, identify experimental dependencies, etc. Therefore, the teacher, organizing the mental activity of students at this level, should select such tasks for students that would involve the performance of one of these mental actions or their various totality. The more independent actions students have to take when completing a task, the more difficult it is. In order for learning to maximize the development of students, the tasks offered by the teacher should be somewhat ahead of their level of development. Both understanding and logical thinking are analytical and synthetic activities, but there are significant differences between them in their source, didactic function and subjective

experience. In the process of thinking, the student independently comes to new conclusions. In the process of understanding, he understands the meaning and consistency of the conclusion made by the teacher. With understanding, the finished message is comprehended and assimilated, while thinking brings out new knowledge. Understanding is subjectively presented differently than logical thinking. The essence of understanding is in recognizing, realizing, clarifying and fixing in consciousness something new in what is perceived and assimilated. The difference between thinking and understanding is huge. It is much easier for a student to follow the logic of a conclusion, its evidence, than to get this conclusion based on his own analytical and synthetic activity. Creative thinking. According to modern views, the process of scientific creativity takes place in three stages. The stage is characterized by the emergence (in the course of cognition or practical activity) of a problematic situation, its initial analysis and formulation of the problem. The stage of the creative process is the search for a way to solve a problem. This search is performed during a detailed analysis of the problem based on available knowledge. If necessary, knowledge about the studied research object can be supplemented by studying the relevant literature or performing the necessary experimental studies. Often, the principle of solution is found purely logically, strictly evidentiary. Sometimes the object of research is not sufficiently known, and knowledge about it is not only incomplete, but also contradictory. In this case, it is not possible to prove the principle of solving the problem that has arisen. Intuition comes to the rescue. The stage of creative cognition is the stage where the contradiction of the principle of solving the problem is found (or guessed) and its verification. At this stage, the principle of the solution is implemented in the form of individual creative results: solving a new problem, justifications and development of constructions, theories, etc. The obtained results are tested experimentally, consistent with other theoretical data, etc. The considered structure of creative activity allows us to identify the essential features of creative thinking. Creative thinking is characterized not only by the development of logical thinking, the vastness of knowledge, but also by flexibility, critical thinking, the speed of updating the necessary knowledge, the ability to express intuitive judgments, solve problems in conditions of complete determinism. In the educational process, it is advisable to include all those tasks as creative, the principle of which is not specified, and often is not explicitly known to students. It should be formulated by them independently, during the analysis of the task, based on existing knowledge and accumulated experience in solving non-standard tasks. The highlighted three conditions of mental activity can be used as the basis for the teacher's system of work to activate the cognitive activity of students. The starting point in this work should be to ensure that students have a deep understanding of the educational material presented by the teacher or in the book (level I). Only against the background of systematic work that ensures a deep understanding of the material by students, various techniques and tasks can be applied that require students to independently solve cognitive tasks of the lesson at the II and III levels of cognitive activity (i.e. based on logical or creative thinking). Development learning student physics ability 5. The physical component of school education, along with humanitarian, socio-economic, mathematical and technological, should ensure the comprehensive development of the student's personality. But if you look at a variety of curricula and textbooks, you will notice inconsistencies between them and educational standards. What is the correlation and interrelation of the humanities and natural sciences areas of study? Traditionally, Russian language and literature teachers are engaged in the development of speech. They introduce students to speech styles. In speech development lessons, children learn to use narratives, reasoning, and descriptions peculiar to the scientific speech style.

Conclusion.

Narration and reasoning acquire a clear sequence and logic if the student is taught how to plan oral and written speech, highlight the most important points, and summarize what has been said. The knowledge of the world and the development of human abilities occur only in the process of his individual independent and active cognitive activity.

Therefore, all experiments on the observation of physical phenomena, experiments on the study of physical properties of bodies, hypothesis testing, accessible and safe for students to perform independently, can be offered to students to perform independently.

Successful study of physics is facilitated by independent interaction with objects of the surrounding world, experimentation, participation in disputes when discussing the results. In physics lessons, the most effective way to combine a problem-based learning method with an activity-based approach to learning is to offer students independent experimental tasks. The above-mentioned problems of teaching physics and the proposals developed by us in solving them are becoming important for the training of young people with competencies in the field of physical sciences.

References:

1. Bekpulatov, U.R. (2020). Physical style of thinking - methodological basis for the formation of a scientific worldview. *ISJ Theoretical & Applied Science*, 09 (89), p. 480. Philadelphia, USA.
2. Cheremisina, Ye.N., Antipov, O.Ye., & Belov, M.A. (2012). Rol virtualnoy kompyuternoy laboratorii na osnove texnologii oblachnix vichisleniy v sovremennom kompyuternom obrazovanii. *Distansionnoye i virtualnoye obucheniye*. - №1.-pp. 50-64.
3. Rittinghouse, J., & Ransome, J. (2010). *Cloud Computing: Implementation, Management, and Security*. - CRC Press, p.46.
4. Kudinov, D.N. (2009). Perspektivi razrabotki virtualnix rabot na baze kompleksa programm T-FLEX // *Sovremennie problemi nauki i obrazovaniya*. - № 6. - pp. 71-74.
5. Truxin, A.V. (2003). Vidы virtualnix kompyuternix laboratoriy. *Otkritoye i distansionnoye obrazovaniye*. - №3(11). -pp. 12-21.
6. Chabay, R., & Sherwood, B. (2006). *Matter and Interaction.* Vol. II: Electric & Magnetic Interaction, JohnWiley. p.20.
7. Hartel, H. (1982). The Electric Circuit as a System: A New Approach. *European Journal of Science Education*, 4, p.4555.
8. Ursul, A.D. (2010). *Priroda informatsii. Filosofskiy ocherk.* (p.231). Chelyabinsk
9. Bekpulatov, U. R. (2019). The emergence and development of the concept of “Symmetry” in Central Asia. *ISJ Theoretical & Applied Science*, 11 (79), pp. 176-180.
10. Bekpulatov, U.R., Musurmonov, M.U., & Hamidov, B. Kh. (2022). The role of the principles of symmetry in the formation of the general theoretical foundation of scientific knowledge and scientific worldview. *ISJ Theoretical & Applied Science*, 03 (107), 7-15.